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## MEMORANDUM

DATE: 4 November 1998

TO: David Bennett, WAM, U.S. EPA, Region X

FROM: Michelle Turner, Chemist, WESTON, Seattle  
*RMM* Roger McGinnis, Senior Environmental Chemist, WESTON, Seattle

SUBJECT: Validation of Semivolatile Organics (BNA) Data  
Laboratory Batch K9805398  
Site: Duwamish River

WORK ASSIGNMENT NO: 46-23-0JZZ

WORK ORDER NO.: 4000-019-038-5200-00

DOC CONTROL NO.: 4000-019-038-AAAK

cc: Bruce Woods, RAP-WAM, U S. EPA, Region X  
Dena Hughes, Site Manager, WESTON, Seattle  
Kevin Mundell-Jackson, Database Management, WESTON, Seattle

The quality assurance review of eight sediment samples, laboratory batch K9805398, collected from the Duwamish River has been completed. Samples were analyzed for semivolatile organics (BNAs) by Columbia Analytical Services of Kelso, Washington using EPA Method 8270. The samples were numbered.

98334000	98334001	98334002	98334003	98334004
98334005	98334006	98334007		

### Data Qualifications

The following comments refer to the laboratory performance in meeting the quality control criteria described in the technical specifications of the laboratory subcontract. The review follows the format described in the *National Functional Guidelines for Organic Data Review* (EPA OSWER Directive 9240.1-05, February 1994)

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QA Batch K9805398 (Semivolatiles)

Site: Duwamish River

Page 2

1. Timeliness

All samples met holding time criteria of 14 days for sample extraction and 40 additional days for extract analysis.

2. GC/MS Instrument Performance Check

All tuning check compound mass abundances and ratios were within required limits

3. Initial Calibration

All target analytes and system monitoring compounds were within required limits for the initial calibration with average relative response factors ( $\overline{RRF}$ ) greater than or equal to 0.05 and percent relative standard deviations (percent RSD) less than or equal to 30 percent.

4. Continuing Calibrations

All target analytes were within required limits for the continuing calibration with  $\overline{RRF}$  percent differences less than 25 percent.

5. Detection Limits—Acceptable

Instrument detection limits met project required quantitation limits.

6. Blanks

a) Laboratory Method Blanks

Laboratory method blank frequency criteria were met.

The following compounds were detected in laboratory method blanks:

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QA Batch K9805398 (Semivolatiles)

Site: Duwamish River

Page 3

Blank ID	Compound (Scan No )	Concentration
KWG9802631-4	Bis(2-ethylhexyl) Phthalate	0.02 (mg/kg)

Reported levels of the above compounds were qualified as undetected with an adjusted quantitation limit (UJ) in samples if concentrations were less than five times concentrations present in the blank (ten times for common laboratory contaminants [e.g., phthalates]). As all results were greater than 10 times the blank concentration, no results were qualified.

b) Field Blanks

No field blanks were associated with this laboratory batch

7. System Monitoring Compounds (Surrogates)

Surrogate compound percent recovery met quality control criteria (P-project, L-laboratory) for all samples except:

Sample	Fraction	Compound	% Recovery	QC Limits
Method Blank	Acid	2-fluorophenol	17	25-121 (P) 27-106 (L)
Method Blank	Base/Neutral	Nitrobenzene-d5	23	23-120 (P) 21-115 (L)

Project requirements specify that samples exhibiting surrogate recoveries less than 30% require corrective action. However, as all surrogate recoveries in the LCS and associated samples were within QC limits and above 30%, the unacceptable method blank surrogate recoveries were considered to be an isolated incident. Results were not qualified based on method blank surrogate data.

8 Laboratory Control Sample (LCS)

All laboratory control sample percent recoveries met QC guidelines (P-project, L-laboratory), with the exception of the following

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QA Batch K9805398 (Semivolatiles)

Site: Duwamish River

Page 4

LCS	Analyte	Percent Recovery	QC Limit	Associated Samples
KWG9802631-3	Pentachlorophenol	31	17-109 (P) 38-107 (L)	98334000 through 98334007

Sample results were qualified as estimated (J) when LCS recoveries were outside project or laboratory limits. Undetected results were also qualified as estimated (UJ) when LCS recoveries were outside project or laboratory limits.

9. Matrix Spike and Matrix Spike Duplicate

Matrix spike (MS) or matrix spike duplicate (MSD) percent recovery for the following compounds were outside QC guidelines (P-project, L-laboratory).

Sample	Fraction	Compound	Percent Recovery	QC Limits
98334003MS	Base/Neutral	2,4-Dinitrotoluene	92	28-89 (P) 40-109 (L)

Project QC limits were considered advisory; recovery was within laboratory limits. No action was taken based solely on MS/MSD data and no sample data were qualified for this analyte.

10. Field Duplicate Analysis

No field duplicate samples were associated with this sample delivery group.

11. Internal Standards Performance

Internal standard areas were within requirements of -50 percent to +100 percent of associated calibration internal standard areas. Retention time shifts for internal standards met requirements of less than 30 seconds

12. Sample Analysis

A cursory raw data review was performed. All laboratory deliverables were present and complete. The case narrative indicated that the 2-fluorophenol surrogate recovery in the Method Blank was outside the control limits; however, as all associated sample surrogate

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QA Batch K9805398 (Semivolatiles)

Site: Duwamish River

Page 5

recoveries were acceptable, no action was taken. Additionally, the pentachlorophenol recovery in the LCS was outside the control limits; however, as the MS/MSD was acceptable, the laboratory took no further action. No other unusual problems were noted.

### 13. Laboratory Contact

No laboratory contact was required.

### Data Assessment

Upon consideration of the data qualifications noted above, the data are ACCEPTABLE for use except where flagged with data qualifiers that modify the usefulness of the individual values.

### Data Qualifiers

U - The compound was analyzed for, but was not detected.

UJ - The compound was analyzed for, but was not detected. The associated quantitation limit is an estimate because quality control criteria were not met.

J - The analyte was positively identified, but the associated numerical value is an estimated quantity because quality control criteria were not met or because concentrations reported are less than CRDL or lowest calibration standard.

R - Quality control indicates that data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification

N - Presumptive evidence of presence of material (tentative identification)

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## COLUMBIA ANALYTICAL SERVICES, INC.

## Analytical Report

Client:  
Project:  
Sample Matrix:

Roy F Weston, Inc  
Duwamish River/4000-027-001-2019-38  
Sediment

Service Request: K9805398  
Date Collected: 8/11/98  
Date Received: 8/12/98

## Base Neutral/Acid Semivolatile Organic Compounds

Sample Name	98334000	Units	mg/Kg (ppm)
Lab Code	K9805398-001	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Bis(2-chloroethyl) Ether	EPA 3550A	8270C	0 04	1	8/17/98	8/26/98	ND	
Phenol	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 03	
2-Chlorophenol	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
1,3-Dichlorobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
1,2-Dichlorobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
1,4-Dichlorobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Benzyl Alcohol	EPA 3550A	8270C	0 05	1	8/17/98	8/26/98	ND	
Bis(2-chloroisopropyl) Ether	EPA 3550A	8270C	0 04	1	8/17/98	8/26/98	ND	
2-Methylphenol	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Hexachloroethane	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
N-Nitrosodi-n-propylamine	EPA 3550A	8270C	0 04	1	8/17/98	8/26/98	ND	
3- and 4-Methylphenol Coelution	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	*
Nitrobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Isophorone	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
2-Nitrophenol	EPA 3550A	8270C	0 1	1	8/17/98	8/26/98	ND	
2,4-Dimethylphenol	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Bis(2-chloroethoxy)methane	EPA 3550A	8270C	0 04	1	8/17/98	8/26/98	ND	
2,4-Dichlorophenol	EPA 3550A	8270C	0 06	1	8/17/98	8/26/98	ND	
Benzoic Acid	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	0 5	
1,2,4-Trichlorobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Naphthalene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
4-Chloroaniline	EPA 3550A	8270C	0 06	1	8/17/98	8/26/98	ND	
Hexachlorobutadiene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
4-Chloro-3-methylphenol	EPA 3550A	8270C	0 04	1	8/17/98	8/26/98	ND	
2-Methylnaphthalene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Hexachlorocyclopentadiene	EPA 3550A	8270C	0 1	1	8/17/98	8/26/98	ND	
2,4,6-Trichlorophenol	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
2,4,5-Trichlorophenol	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
2-Chloronaphthalene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
2-Nitroaniline	EPA 3550A	8270C	0 1	1	8/17/98	8/26/98	ND	
Acenaphthylene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Dimethyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
2,6-Dinitrotoluene	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
Acenaphthene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
3-Nitroaniline	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
2,4-Dinitrophenol	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
Dibenzofuran	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
4-Nitrophenol	EPA 3550A	8270C	0 1	1	8/17/98	8/26/98	ND	
2,4-Dinitrotoluene	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
Fluorene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 04	
4-Chlorophenyl Phenyl Ether	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Diethyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	

\* 3-and 4-Methylphenol coelute, quantitated using 4-Methylphenol

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## COLUMBIA ANALYTICAL SERVICES, INC.

## Analytical Report

Client:  
Project:  
Sample Matrix:

Roy F Weston, Inc  
Duwamish River/4000-027-001-2019-38  
Sediment

Service Request: K9805398  
Date Collected: 8/11/98  
Date Received: 8/12/98

## Base Neutral/Acid Semivolatile Organic Compounds

Sample Name	98334000	Units	mg/Kg (ppm)					
Lab Code	K9805398-001	Basis	Dry					
Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
4-Nitroaniline	EPA 3550A	8270C	0 1	1	8/17/98	8/26/98	ND	
2-Methyl-4,6-dinitrophenol	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
N-Nitrosodiphenylamine	EPA 3550A	8270C	0 04	1	8/17/98	8/26/98	ND	
4-Bromophenyl Phenyl Ether	EPA 3550A	8270C	0 04	1	8/17/98	8/26/98	ND	
Hexachlorobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Pentachlorophenol (PCP)	EPA 3550A	8270C	0 1	1	8/17/98	8/30/98	ND	WT
Phenanthrene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 22	
Anthracene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 09	
Di-n-butyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Fluoranthene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 56	
Pyrene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 55	
Butyl Benzyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 06	
3,3'-Dichlorobenzidine	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
Benz(a)anthracene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 29	
Chrysene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 43	
Bis(2-ethylhexyl) Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 88	
Di-n-octyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Benzo(b)fluoranthene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 38	
Benzo(k)fluoranthene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 29	
Benzo(a)pyrene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 30	
Indeno(1,2,3-cd)pyrene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 21	
Dibenz(a,h)anthracene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 05	
Benzo(g,h,i)perylene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 22	
Carbazole	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 03	

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Approved By \_\_\_\_\_  
152p/052595

CGaines

Date \_\_\_\_\_

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**COLUMBIA ANALYTICAL SERVICES, INC.**

Analytical Report

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9805398  
**Date Collected:** 8/11/98  
**Date Received:** 8/12/98  
**Date Extracted:** 8/17/98  
**Date Analyzed:** 8/26/98

**Tentatively Identified Compounds (TIC)**  
**Base Neutral/Acid Semivolatile Organic Compounds**

**Sample Name** 98334000  
**Lab Code** K9805398-001  
**Test Notes**

**Prep Method:** EPA 3550A  
**Analysis Method:** 8270C  
**Units:** mg/Kg (ppm)  
**Basis:** Dry

<b>CAS Number</b>	<b>TIC</b>	<b>Retention Time (minutes)</b>	<b>Estimated Concentration</b>	<b>Result Notes</b>
923-28-4	3-Octanone, 2-methyl-	9 06	0 3	
54832-83-6	1H-Indene, octahydro-2,2,4,4,7,7-he	14 61	0 1	
-	Unknown	16 45	0 3	
-	Unknown	27 79	0 4	
192-97-2	Benzo(e)pyrene	28 85	0 3	
-	Unknown	29 95	0 6	
36728-72-0	28-Nor-17 beta.(H)-hopane	30 53	0 6	
57-88-5	Cholesterol	31 06	0 8	
-	Unknown	31 34	0 7	
-	Unknown	31 49	0 2	
-	Unknown	32 39	0 4	
-	Unknown PAH	32 54	0 3	
-	Unknown	33 42	0 4	
-	Unknown	33 49	0 4	
-	Unknown	33 58	0 4	
-	Unknown	34 11	1 2	

Approved By \_\_\_\_\_  
 TIC05398SVM.AY1 - IT 9/14/98

*CC Barnes*

Date

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Page No

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## COLUMBIA ANALYTICAL SERVICES, INC.

## Analytical Report

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9805398  
**Date Collected:** 8/11/98  
**Date Received:** 8/12/98

## Base Neutral/Acid Semivolatile Organic Compounds

Sample Name	98334001						Units	mg/Kg (ppm)
Lab Code	K9805398-002						Basis	Dry
Test Notes								
Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Bis(2-chloroethyl) Ether	EPA 3550A	8270C	0.04	1	8/17/98	8/26/98	ND	
Phenol	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
2-Chlorophenol	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
1,3-Dichlorobenzene	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
1,2-Dichlorobenzene	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
1,4-Dichlorobenzene	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
Benzyl Alcohol	EPA 3550A	8270C	0.05	1	8/17/98	8/26/98	ND	
Bis(2-chloroisopropyl) Ether	EPA 3550A	8270C	0.04	1	8/17/98	8/26/98	ND	
2-Methylphenol	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
Hexachloroethane	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
N-Nitrosodi-n-propylamine	EPA 3550A	8270C	0.04	1	8/17/98	8/26/98	ND	
3- and 4-Methylphenol Coelution	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	*
Nitrobenzene	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
Isophorone	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
2-Nitrophenol	EPA 3550A	8270C	0.1	1	8/17/98	8/26/98	ND	
2,4-Dimethylphenol	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
Bis(2-chloroethoxy)methane	EPA 3550A	8270C	0.04	1	8/17/98	8/26/98	ND	
2,4-Dichlorophenol	EPA 3550A	8270C	0.06	1	8/17/98	8/26/98	ND	
Benzoic Acid	EPA 3550A	8270C	0.2	1	8/17/98	8/26/98	ND	
1,2,4-Trichlorobenzene	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
Naphthalene	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
4-Chloroaniline	EPA 3550A	8270C	0.06	1	8/17/98	8/26/98	ND	
Hexachlorobutadiene	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
4-Chloro-3-methylphenol	EPA 3550A	8270C	0.04	1	8/17/98	8/26/98	ND	
2-Methylnaphthalene	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
Hexachlorocyclopentadiene	EPA 3550A	8270C	0.1	1	8/17/98	8/26/98	ND	
2,4,6-Trichlorophenol	EPA 3550A	8270C	0.2	1	8/17/98	8/26/98	ND	
2,4,5-Trichlorophenol	EPA 3550A	8270C	0.2	1	8/17/98	8/26/98	ND	
2-Chloronaphthalene	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
2-Nitroaniline	EPA 3550A	8270C	0.1	1	8/17/98	8/26/98	ND	
Acenaphthylene	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
Dimethyl Phthalate	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
2,6-Dinitrotoluene	EPA 3550A	8270C	0.2	1	8/17/98	8/26/98	ND	
Acenaphthene	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	0.02	
3-Nitroaniline	EPA 3550A	8270C	0.2	1	8/17/98	8/26/98	ND	
2,4-Dinitrophenol	EPA 3550A	8270C	0.2	1	8/17/98	8/26/98	ND	
Dibenzofuran	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
4-Nitrophenol	EPA 3550A	8270C	0.1	1	8/17/98	8/26/98	ND	
2,4-Dinitrotoluene	EPA 3550A	8270C	0.2	1	8/17/98	8/26/98	ND	
Fluorene	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	0.03	
4-Chlorophenyl Phenyl Ether	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
Diethyl Phthalate	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	

\* 3-and 4-Methylphenol coelute, quantitated using 4-Methylphenol

WGT 10/17/98

## COLUMBIA ANALYTICAL SERVICES, INC.

## Analytical Report

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9805398  
**Date Collected:** 8/11/98  
**Date Received:** 8/12/98

## Base Neutral/Acid Semivolatile Organic Compounds

Sample Name	98334001	Units	mg/Kg (ppm)					
Lab Code	K9805398-002	Basis	Dry					
Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
4-Nitroaniline	EPA 3550A	8270C	0 1	1	8/17/98	8/26/98	ND	
2-Methyl-4,6-dinitrophenol	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
N-Nitrosodiphenylamine	EPA 3550A	8270C	0 04	1	8/17/98	8/26/98	ND	
4-Bromophenyl Phenyl Ether	EPA 3550A	8270C	0 04	1	8/17/98	8/26/98	ND	
Hexachlorobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Pentachlorophenol (PCP)	EPA 3550A	8270C	0 1	1	8/17/98	8/30/98	ND	L-L-J
Phenanthrene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 25	
Anthracene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 12	
Di-n-butyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Fluoranthene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 46	
Pyrene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 76	
Butyl Benzyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 08	
3,3'-Dichlorobenzidine	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
Benz(a)anthracene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 37	
Chrysene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 56	
Bis(2-ethylhexyl) Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 97	
Di-n-octyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Benzo(b)fluoranthene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 54	
Benzo(k)fluoranthene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 41	
Benzo(a)pyrene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 41	
Indeno(1,2,3-cd)pyrene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 24	
Diベンzo(a,h)anthracene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 06	
Benzo(g,h,i)perylene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 24	
Carbazole	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 03	

Approved By: \_\_\_\_\_  
 IS2P\032985VM.AY1 - 29/14/98

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Date: \_\_\_\_\_

SEP 14 1998

00043  
Page No.

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**COLUMBIA ANALYTICAL SERVICES, INC.**

Analytical Report

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9805398  
**Date Collected:** 8/11/98  
**Date Received:** 8/12/98  
**Date Extracted:** 8/17/98  
**Date Analyzed:** 8/26/98

Tentatively Identified Compounds (TIC)  
 Base Neutral/Acid Semivolatile Organic Compounds

Sample Name 98334001  
 Lab Code K9805398-002  
 Test Notes

Prep Method EPA 3550A  
 Analysis Method 8270C  
 Units mg/Kg (ppm)  
 Basis Dry

CAS Number	TIC	Retention Time (minutes)	Estimated Concentration	Result Notes
503-86-6	Glycocyanidine	9.07	0.2	
7704-34-9	Sulfur	22.35	0.1	
-	Unknown PAH	23.17	0.2	
-	Benzo(b)naphthothiophene isomer	24.34	0.3	
-	Unknown	26.29	0.3	
-	Unknown	27.83	0.4	
192-97-2	Benzo(e)pyrene	28.89	0.3	
-	Unknown	29.98	0.6	
-	28-Nor-17 beta (H)-hopane isomer	30.57	0.6	
57-88-5	Cholesterol	31.09	0.5	
-	28-Nor17 beta (H)-hopane isomer	31.38	0.9	
-	Unknown	32.41	0.5	
-	Unknown	33.30	0.2	
-	Unknown	33.46	0.3	
-	Unknown	33.52	0.5	
-	Unknown	33.62	0.5	
-	Unknown	34.16	1.2	

*MGT 10/17/98*

Approved By \_\_\_\_\_

*CCobine*

SEP 14 1998

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Date \_\_\_\_\_

00044

Page No

## COLUMBIA ANALYTICAL SERVICES, INC.

## Analytical Report

Client: Roy F Weston, Inc  
 Project: Duwamish River/4000-027-001-2019-38  
 Sample Matrix: Sediment

Service Request: K9805398  
 Date Collected: 8/11/98  
 Date Received: 8/12/98

## Base Neutral/Acid Semivolatile Organic Compounds

Sample Name	98334002	Units	mg/Kg (ppm)
Lab Code	K9805398-003	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Bis(2-chloroethyl) Ether	EPA 3550A	8270C	0.04	1	8/17/98	8/28/98	ND	
Phenol	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	0.02	
2-Chlorophenol	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
1,3-Dichlorobenzene	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
1,2-Dichlorobenzene	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
1,4-Dichlorobenzene	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
Benzyl Alcohol	EPA 3550A	8270C	0.05	1	8/17/98	8/28/98	ND	
Bis(2-chloroisopropyl) Ether	EPA 3550A	8270C	0.04	1	8/17/98	8/28/98	ND	
2-Methylphenol	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
Hexachloroethane	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
N-Nitrosodi-n-propylamine	EPA 3550A	8270C	0.04	1	8/17/98	8/28/98	ND	
3- and 4-Methylphenol Coelution	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	*
Nitrobenzene	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
Isophorone	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
2-Nitrophenol	EPA 3550A	8270C	0.1	1	8/17/98	8/28/98	ND	
2,4-Dimethylphenol	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
Bis(2-chloroethoxy)methane	EPA 3550A	8270C	0.04	1	8/17/98	8/28/98	ND	
2,4-Dichlorophenol	EPA 3550A	8270C	0.06	1	8/17/98	8/28/98	ND	
Benzoic Acid	EPA 3550A	8270C	0.2	1	8/17/98	8/28/98	ND	
1,2,4-Trichlorobenzene	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
Naphthalene	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
4-Chloroaniline	EPA 3550A	8270C	0.06	1	8/17/98	8/28/98	ND	
Hexachlorobutadiene	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
4-Chloro-3-methylphenol	EPA 3550A	8270C	0.04	1	8/17/98	8/28/98	ND	
2-Methylnaphthalene	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
Hexachlorocyclopentadiene	EPA 3550A	8270C	0.1	1	8/17/98	8/28/98	ND	
2,4,6-Trichlorophenol	EPA 3550A	8270C	0.2	1	8/17/98	8/28/98	ND	
2,4,5-Trichlorophenol	EPA 3550A	8270C	0.2	1	8/17/98	8/28/98	ND	
2-Chloronaphthalene	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
2-Nitroaniline	EPA 3550A	8270C	0.1	1	8/17/98	8/28/98	ND	
Acenaphthylene	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
Dimethyl Phthalate	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
2,6-Dinitrotoluene	EPA 3550A	8270C	0.2	1	8/17/98	8/28/98	ND	
Acenaphthene	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
3-Nitroaniline	EPA 3550A	8270C	0.2	1	8/17/98	8/28/98	ND	
2,4-Dinitrophenol	EPA 3550A	8270C	0.2	1	8/17/98	8/28/98	ND	
Dibenzofuran	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	0.02	
4-Nitrophenol	EPA 3550A	8270C	0.1	1	8/17/98	8/28/98	ND	
2,4-Dinitrotoluene	EPA 3550A	8270C	0.2	1	8/17/98	8/28/98	ND	
Fluorene	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	0.04	
4-Chlorophenyl Phenyl Ether	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
Diethyl Phthalate	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	

\* 3-and 4-Methylphenol coelute, quantitated using 4-Methylphenol!

Approved By  
65398SVMAY1 - 39/14/98

C. C. Heines

Date

SEP 14 1998

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Page No

MG10/11/98

## COLUMBIA ANALYTICAL SERVICES, INC.

## Analytical Report

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9805398  
**Date Collected:** 8/11/98  
**Date Received:** 8/12/98

## Base Neutral/Acid Semivolatile Organic Compounds

Sample Name	98334002		Units	mg/Kg (ppm)				
Lab Code	K9805398-003		Basis	Dry				
Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
4-Nitroaniline	EPA 3550A	8270C	0 1	1	8/17/98	8/28/98	ND	
2-Methyl-4,6-dinitrophenol	EPA 3550A	8270C	0 2	1	8/17/98	8/28/98	ND	
N-Nitrosodiphenylamine	EPA 3550A	8270C	0 04	1	8/17/98	8/28/98	ND	
4-Bromophenyl Phenyl Ether	EPA 3550A	8270C	0 04	1	8/17/98	8/28/98	ND	
Hexachlorobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	ND	
Pentachlorophenol (PCP)	EPA 3550A	8270C	0 1	1	8/17/98	8/30/98	ND	WT
Phenanthrene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 29	
Anthracene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 13	
Di-n-butyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 02	
Fluoranthene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 99	
Pyrene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 76	
Butyl Benzyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 07	
3,3'-Dichlorobenzidine	EPA 3550A	8270C	0 2	1	8/17/98	8/28/98	ND	
Benz(a)anthracene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 49	
Chrysene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 66	
Bis(2-ethylhexyl) Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 88	
Di-n-octyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	ND	
Benzo(b)fluoranthene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 49	
Benzo(k)fluoranthene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 49	
Benzo(a)pyrene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 42	
Indeno(1,2,3-cd)pyrene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 27	
Dibenz(a,h)anthracene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 08	
Benzo(g,h,i)perylene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 27	
Carbazole	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 05	

Approved By: \_\_\_\_\_  
 IS2P000055VM.AY1 - 39/14/98

C. Heines

Date

SEP 14 1998

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Page No

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**COLUMBIA ANALYTICAL SERVICES, INC.**

## Analytical Report

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9805398  
**Date Collected:** 8/11/98  
**Date Received:** 8/12/98  
**Date Extracted:** 8/17/98  
**Date Analyzed:** 8/28/98

Tentatively Identified Compounds (TIC)  
Base Neutral/Acid Semivolatile Organic Compounds

**Sample Name** 98334002  
**Lab Code** K9805398-003  
**Test Notes**

**Prep Method** EPA 3550A  
**Analysis Method** 8270C  
**Units** mg/Kg (ppm)  
**Basis** Dry

<b>CAS Number</b>	<b>TIC</b>	<b>Retention Time (minutes)</b>	<b>Estimated Concentration</b>	<b>Result Notes</b>
-	Unknown	20 31	0 2	
-	Unknown	22 52	0 2	
-	Unknown	23 01	0 2	
-	1-Hexacosanal	27 48	0 8	
198-55-0	Perylene	28 98	0 2	
-	Unknown	29 09	0 2	
-	Unknown	29 75	0 7	
-	Unknown	30 29	0 6	
57-88-5	Cholesterol	30 80	0 8	
-	Unknown	31 06	1	
-	Unknown	33 05	0 3	
-	Unknown	33 13	0 4	
-	Unknown	33 72	2	

mg/Kg (ppm)  
Date 10/17/98

Approved By \_\_\_\_\_

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SEP 14 1998

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Page No

## COLUMBIA ANALYTICAL SERVICES, INC.

## Analytical Report

Client: Roy F Weston, Inc  
 Project: Duwamish River/4000-027-001-2019-38  
 Sample Matrix: Sediment

Service Request: K9805398  
 Date Collected: 8/11/98  
 Date Received: 8/12/98

## Base Neutral/Acid Semivolatile Organic Compounds

Sample Name	98334003	Units	mg/Kg (ppm)					
Lab Code	K9805398-004	Basis	Dry					
Test Notes								
Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Bis(2-chloroethyl) Ether	EPA 3550A	8270C	0 04	1	8/17/98	8/26/98	ND	
Phenol	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 08	
2-Chlorophenol	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
1,3-Dichlorobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
1,2-Dichlorobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
1,4-Dichlorobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Benzyl Alcohol	EPA 3550A	8270C	0 05	1	8/17/98	8/26/98	ND	
Bis(2-chloroisopropyl) Ether	EPA 3550A	8270C	0 04	1	8/17/98	8/26/98	ND	
2-Methylphenol	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Hexachloroethane	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
N-Nitrosodi-n-propylamine	EPA 3550A	8270C	0 04	1	8/17/98	8/26/98	ND	
3- and 4-Methylphenol Coelution	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	*
Nitrobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Isophorone	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
2-Nitrophenol	EPA 3550A	8270C	0 1	1	8/17/98	8/26/98	ND	
2,4-Dimethylphenol	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Bis(2-chloroethoxy)methane	EPA 3550A	8270C	0 04	1	8/17/98	8/26/98	ND	
2,4-Dichlorophenol	EPA 3550A	8270C	0 06	1	8/17/98	8/26/98	ND	
Benzoic Acid	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
1,2,4-Trichlorobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Naphthalene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
4-Chloroaniline	EPA 3550A	8270C	0 06	1	8/17/98	8/26/98	ND	
Hexachlorobutadiene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
4-Chloro-3-methylphenol	EPA 3550A	8270C	0 04	1	8/17/98	8/26/98	ND	
2-Methylnaphthalene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Hexachlorocyclopentadiene	EPA 3550A	8270C	0 1	1	8/17/98	8/26/98	ND	
2,4,6-Trichlorophenol	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
2,4,5-Trichlorophenol	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
2-Chloronaphthalene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
2-Nitroaniline	EPA 3550A	8270C	0 1	1	8/17/98	8/26/98	ND	
Acenaphthylene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Dimethyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
2,6-Dinitrotoluene	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
Acenaphthene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 02	
3-Nitroaniline	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
2,4-Dinitrophenol	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
Dibenzofuran	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
4-Nitrophenol	EPA 3550A	8270C	0 1	1	8/17/98	8/26/98	ND	
2,4-Dinitrotoluene	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
Fluorene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 03	
4-Chlorophenyl Phenyl Ether	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Diethyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	

\* 3-and 4-Methylphenol coelute, quantitated using 4-Methylphenol

MEP 10/17/98

## COLUMBIA ANALYTICAL SERVICES, INC.

## Analytical Report

Client: Roy F Weston, Inc  
 Project: Duwamish River/4000-027-001-2019-38  
 Sample Matrix: Sediment

Service Request: K9805398  
 Date Collected: 8/11/98  
 Date Received: 8/12/98

## Base Neutral/Acid Semivolatile Organic Compounds

Sample Name	98334003	Units	mg/Kg (ppm)					
Lab Code:	K9805398-004	Basis	Dry					
Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
4-Nitroaniline	EPA 3550A	8270C	0 1	1	8/17/98	8/26/98	ND	
2-Methyl-4,6-dinitrophenol	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
N-Nitrosodiphenylamine	EPA 3550A	8270C	0 04	1	8/17/98	8/26/98	ND	
4-Bromophenyl Phenyl Ether	EPA 3550A	8270C	0 04	1	8/17/98	8/26/98	ND	
Hexachlorobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Pentachlorophenol (PCP)	EPA 3550A	8270C	0 1	1	8/17/98	8/31/98	ND <i>LJ</i>	
Phenanthrene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 20	
Anthracene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 12	
Di-n-butyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Fluoranthene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 81	
Pyrene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 69	
Butyl Benzyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
3,3'-Dichlorobenzidine	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
Benz(a)anthracene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 34	
Chrysene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 45	
Bis(2-ethylhexyl) Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 35	X
Di-n-octyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Benzo(b)fluoranthene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 36	
Benzo(k)fluoranthene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 30	
Benzo(a)pyrene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 31	
Indeno(1,2,3-cd)pyrene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 18	
Dibenz(a,h)anthracene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 05	
Benzo(g,h,i)perylene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 17	
Carbazole	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 03	

X

Analyte found in the method blank and sample

Approved By \_\_\_\_\_  
152p/052595*C. C. Kleines*

Date \_\_\_\_\_

SEP 14 1998

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**COLUMBIA ANALYTICAL SERVICES, INC.**

Analytical Report

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9805398  
**Date Collected:** 8/11/98  
**Date Received:** 8/12/98  
**Date Extracted:** 8/17/98  
**Date Analyzed:** 8/26/98

Tentatively Identified Compounds (TIC)  
 Base Neutral/Acid Semivolatile Organic Compounds

Sample Name 98334003  
 Lab Code K9805398-004  
 Test Notes

Prep Method	EPA 3550A
Analysis Method	8270C
Units	mg/Kg (ppm)
Basis	Dry

CAS Number	TIC	Retention Time (minutes)	Estimated Concentration	Result Notes
544-63-8	Tetradecanoic acid	19 19	0 09	
-	Unknown PAH	20 91	0 06	
-	Unknown	21 08	0 1	
10544-50-0	Sulfur, mol (S8)	22 22	0 09	
-	Benzo(b)naphtho(1,2-d)thiophene isomer	24 31	0 2	
-	Unknown	24 72	0 2	
-	Unknown	25 12	0 2	
-	Unknown	25 49	0 2	
-	Unknown	27 77	0 3	
192-97-2	Benzo(e)pyrene	28 84	0 3	
-	Unknown	29 94	0 5	
-	Unknown	30 52	0 3	
57-88-5	Cholesterol	31 05	1 0	
-	Unknown	31 33	0 4	
-	Unknown	31 47	0 3	
-	Unknown	33 22	0 2	
-	Unknown	33 40	0 3	
-	Unknown	33 47	0 2	
-	Unknown	34 08	0 6	

*MAT 10/17/98*

Approved By \_\_\_\_\_

*CC Barnes*

**SEP 14 1998**

Date \_\_\_\_\_

**00050**

Page No

## COLUMBIA ANALYTICAL SERVICES, INC.

## Analytical Report

Client: Roy F Weston, Inc  
 Project: Duwamish River/4000-027-001-2019-38  
 Sample Matrix: Sediment

Service Request: K9805398  
 Date Collected: 8/11/98  
 Date Received: 8/12/98

## Base Neutral/Acid Semivolatile Organic Compounds

Sample Name	98334004						Units	mg/Kg (ppm)
Lab Code	K9805398-005						Basis	Dry
Test Notes								
Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Bis(2-chloroethyl) Ether	EPA 3550A	8270C	0.04	1	8/17/98	8/26/98	ND	
Phenol	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	0.05	
2-Chlorophenol	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
1,3-Dichlorobenzene	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
1,2-Dichlorobenzene	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
1,4-Dichlorobenzene	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
Benzyl Alcohol	EPA 3550A	8270C	0.05	1	8/17/98	8/26/98	ND	
Bis(2-chloroisopropyl) Ether	EPA 3550A	8270C	0.04	1	8/17/98	8/26/98	ND	
2-Methylphenol	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
Hexachloroethane	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
N-Nitrosodi-n-propylamine	EPA 3550A	8270C	0.04	1	8/17/98	8/26/98	ND	
3- and 4-Methylphenol Coelution	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	*
Nitrobenzene	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
Isophorone	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
2-Nitrophenol	EPA 3550A	8270C	0.1	1	8/17/98	8/26/98	ND	
2,4-Dimethylphenol	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
Bis(2-chloroethoxy)methane	EPA 3550A	8270C	0.04	1	8/17/98	8/26/98	ND	
2,4-Dichlorophenol	EPA 3550A	8270C	0.06	1	8/17/98	8/26/98	ND	
Benzoic Acid	EPA 3550A	8270C	0.2	1	8/17/98	8/26/98	ND	
1,2,4-Trichlorobenzene	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
Naphthalene	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	0.03	
4-Chloroaniline	EPA 3550A	8270C	0.06	1	8/17/98	8/26/98	ND	
Hexachlorobutadiene	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
4-Chloro-3-methylphenol	EPA 3550A	8270C	0.04	1	8/17/98	8/26/98	ND	
2-Methylnaphthalene	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	0.02	
Hexachlorocyclopentadiene	EPA 3550A	8270C	0.1	1	8/17/98	8/26/98	ND	
2,4,6-Trichlorophenol	EPA 3550A	8270C	0.2	1	8/17/98	8/26/98	ND	
2,4,5-Trichlorophenol	EPA 3550A	8270C	0.2	1	8/17/98	8/26/98	ND	
2-Chloronaphthalene	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
2-Nitroaniline	EPA 3550A	8270C	0.1	1	8/17/98	8/26/98	ND	
Acenaphthylene	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
Dimethyl Phthalate	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
2,6-Dinitrotoluene	EPA 3550A	8270C	0.2	1	8/17/98	8/26/98	ND	
Acenaphthene	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	0.06	
3-Nitroaniline	EPA 3550A	8270C	0.2	1	8/17/98	8/26/98	ND	
2,4-Dinitrophenol	EPA 3550A	8270C	0.2	1	8/17/98	8/26/98	ND	
Dibenzofuran	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	0.02	
4-Nitrophenol	EPA 3550A	8270C	0.1	1	8/17/98	8/26/98	ND	
2,4-Dinitrotoluene	EPA 3550A	8270C	0.2	1	8/17/98	8/26/98	ND	
Fluorene	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	0.08	
4-Chlorophenyl Phenyl Ether	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	
Diethyl Phthalate	EPA 3550A	8270C	0.02	1	8/17/98	8/26/98	ND	

\* 3-and 4-Methylphenol coelute, quantitated using 4-Methylphenol

Approved By  
K9805398-SVM-A1 - 591498

C C Daines

Date

SEP 14 1998

00051

MG 10/17/98

## COLUMBIA ANALYTICAL SERVICES, INC.

## Analytical Report

Client: Roy F Weston, Inc  
 Project: Duwamish River/4000-027-001-2019-38  
 Sample Matrix: Sediment

Service Request: K9805398  
 Date Collected: 8/11/98  
 Date Received: 8/12/98

## Base Neutral/Acid Semivolatile Organic Compounds

Sample Name	98334004	Units	mg/Kg (ppm)
Lab Code	K9805398-005	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
4-Nitroaniline	EPA 3550A	8270C	0 1	1	8/17/98	8/26/98	ND	
2-Methyl-4,6-dinitrophenol	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
N-Nitrosodiphenylamine	EPA 3550A	8270C	0 04	1	8/17/98	8/26/98	ND	
4-Bromophenyl Phenyl Ether	EPA 3550A	8270C	0 04	1	8/17/98	8/26/98	ND	
Hexachlorobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Pentachlorophenol (PCP)	EPA 3550A	8270C	0 1	1	8/17/98	8/31/98	ND	WT
Phenanthrene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 63	
Anthracene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 35	
Di-n-butyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Fluoranthene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	1.2	
Pyrene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	1 2	
Butyl Benzyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
3,3'-Dichlorobenzidine	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
Benz(a)anthracene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 62	
Chrysene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 79	
Bis(2-ethylhexyl) Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 59	
Di-n-octyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Benzo(b)fluoranthene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 58	
Benzo(k)fluoranthene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 46	
Benzo(a)pyrene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 55	
Indeno(1,2,3-cd)pyrene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 34	
Dibenz(a,h)anthracene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 08	
Benzo(g,h,i)perylene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 33	
Carbazole	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 05	

Approved By \_\_\_\_\_  
 IS2P/6533985VM.AY1 - 5 9/14/98

C. Colvin

Date \_\_\_\_\_

SEP 14 1998

00052

WT 10/17/98

## COLUMBIA ANALYTICAL SERVICES, INC.

## Analytical Report

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9805398  
**Date Collected:** 8/11/98  
**Date Received:** 8/12/98  
**Date Extracted:** 8/17/98  
**Date Analyzed:** 8/26/98

Tentatively Identified Compounds (TIC)  
Base Neutral/Acid Semivolatile Organic Compounds

**Sample Name:** 98334004  
**Lab Code:** K9805398-005  
**Test Notes:**

**Prep Method:** EPA 3550A  
**Analysis Method:** 8270C  
**Units:** mg/Kg (ppm)  
**Basis:** Dry

CAS Number	TIC	Retention Time (minutes)	Estimated Concentration	Result Notes
-	Anthracene, methyl isomer	20 84	0 1	
-	Unknown	21 02	0 3	
-	Unknown	22 23	0 2	
-	Pyrene, methyl isomer	23 16	0 3	
-	Pyrene, methyl isomer	23 20	0 2	
-	Pyrene, methyl isomer	23 31	0 2	
-	Unknown	25 33	0 2	
-	Unknown	27 79	0 4	
192-97-2	Benzo(e)pyrene	28 88	0 5	
-	Unknown	29 96	0 6	
36728-72-0	28-Nor-17 beta (H)-hopane	30 55	0 5	
57-88-5	Cholesterol	31 08	1 1	
-	Unknown	31 35	0 5	
313-04-2	Desmosterol	31 50	0 6	
-	Unknown	33 27	0 5	
-	Unknown	33 45	0 3	
-	Unknown	33 50	0 3	
-	Unknown	33 61	0 2	
-	Unknown	34 13	0 7	
-	Unknown	35 16	0 3	

MGT 10/17/98

Approved By \_\_\_\_\_

C Caines

Date SEP 14 1998

TIC/052595  
05398SVM.AY1 - ST 9/14/98

00053

## COLUMBIA ANALYTICAL SERVICES, INC.

## Analytical Report

Client: Roy F Weston, Inc  
 Project: Duwamish River/4000-027-001-2019-38  
 Sample Matrix: Sediment

Service Request: K9805398  
 Date Collected: 8/11/98  
 Date Received: 8/12/98

## Base Neutral/Acid Semivolatile Organic Compounds

Sample Name	98334005						Units	mg/Kg (ppm)
Lab Code	K9805398-006						Basis	Dry
Test Notes								
Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Bis(2-chloroethyl) Ether	EPA 3550A	8270C	0 04	1	8/17/98	8/26/98	ND	
Phenol	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 25	
2-Chlorophenol	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
1,3-Dichlorobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
1,2-Dichlorobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
1,4-Dichlorobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Benzyl Alcohol	EPA 3550A	8270C	0 05	1	8/17/98	8/26/98	ND	
Bis(2-chloroisopropyl) Ether	EPA 3550A	8270C	0 04	1	8/17/98	8/26/98	ND	
2-Methylphenol	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Hexachloroethane	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
N-Nitrosodi-n-propylamine	EPA 3550A	8270C	0 04	1	8/17/98	8/26/98	ND	
3- and 4-Methylphenol Coelution	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	*
Nitrobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Iso phorone	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
2-Nitrophenol	EPA 3550A	8270C	0 1	1	8/17/98	8/26/98	ND	
2,4-Dimethylphenol	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Bis(2-chloroethoxy)methane	EPA 3550A	8270C	0 04	1	8/17/98	8/26/98	ND	
2,4-Dichlorophenol	EPA 3550A	8270C	0 06	1	8/17/98	8/26/98	ND	
Benzoic Acid	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
1,2,4-Trichlorobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Naphthalene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 06	
4-Chloroaniline	EPA 3550A	8270C	0 06	1	8/17/98	8/26/98	ND	
Hexachlorobutadiene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
4-Chloro-3-methylphenol	EPA 3550A	8270C	0 04	1	8/17/98	8/26/98	ND	
2-Methylnaphthalene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 13	
Hexachlorocyclopentadiene	EPA 3550A	8270C	0 1	1	8/17/98	8/26/98	ND	
2,4,6-Trichlorophenol	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
2,4,5-Trichlorophenol	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
2-Chloronaphthalene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
2-Nitroaniline	EPA 3550A	8270C	0 1	1	8/17/98	8/26/98	ND	
Acenaphthylene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 06	
Dimethyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
2,6-Dinitrotoluene	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
Acenaphthene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 31	
3-Nitroaniline	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
2,4-Dinitrophenol	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
Dibenzofuran	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 25	
4-Nitrophenol	EPA 3550A	8270C	0 1	1	8/17/98	8/26/98	ND	
2,4-Dinitrotoluene	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
Fluorene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 57	
4-Chlorophenyl Phenyl Ether	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Diethyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	

\* 3-and 4-Methylphenol coelute, quantitated using 4-Methylphenol

Approved By

*CC*

Date

9/15/98

00054

## COLUMBIA ANALYTICAL SERVICES, INC.

## Analytical Report

Client: Roy F Weston, Inc  
 Project: Duwamish River/4000-027-001-2019-38  
 Sample Matrix: Sediment

Service Request: K9805398  
 Date Collected: 8/11/98  
 Date Received: 8/12/98

## Base Neutral/Acid Semivolatile Organic Compounds

Sample Name	98334005			Units	mg/Kg (ppm)			
Lab Code	K9805398-006			Basis	Dry			
Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
4-Nitroaniline	EPA 3550A	8270C	0 1	1	8/17/98	8/26/98	ND	
2-Methyl-4,6-dinitrophenol	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
N-Nitrosodiphenylamine	EPA 3550A	8270C	0 04	1	8/17/98	8/26/98	ND	
4-Bromophenyl Phenyl Ether	EPA 3550A	8270C	0 04	1	8/17/98	8/26/98	ND	
Hexachlorobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Pentachlorophenol (PCP)	EPA 3550A	8270C	0 1	1	8/17/98	8/31/98	ND	WT
Phenanthrene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	2 6	
Anthracene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	1 5	
Di-n-butyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 02	
Fluoranthene	EPA 3550A	8270C	0 1	5	8/17/98	9/1/98	6 4	
Pyrene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	3 3	
Butyl Benzyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 03	
3,3'-Dichlorobenzidine	EPA 3550A	8270C	0 2	1	8/17/98	8/26/98	ND	
Benz(a)anthracene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	1 9	
Chrysene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	2 4	
Bis(2-ethylhexyl) Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 61	
Di-n-octyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	ND	
Benzo(b)fluoranthene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	1 6	
Benzo(k)fluoranthene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	1 1	
Benzo(a)pyrene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	1 3	
Indeno(1,2,3-cd)pyrene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 77	
Dibenz(a,h)anthracene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 19	
Benzo(g,h,i)perylene	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 62	
Carbazole	EPA 3550A	8270C	0 02	1	8/17/98	8/26/98	0 37	

Approved By \_\_\_\_\_  
 1S2p032595

CC Kleines

Date

9/15/98

00055

**COLUMBIA ANALYTICAL SERVICES, INC.**

Analytical Report

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9805398  
**Date Collected:** 8/11/98  
**Date Received:** 8/12/98  
**Date Extracted:** 8/17/98  
**Date Analyzed:** 8/26/98

**Tentatively Identified Compounds (TIC)  
Base Neutral/Acid Semivolatile Organic Compounds**

**Sample Name:** 98334005  
**Lab Code:** K9805398-006  
**Test Notes:**

**Prep Method:** EPA 3550A  
**Analysis Method:** 8270C  
**Units:** mg/Kg (ppm)  
**Basis:** Dry

<b>CAS Number</b>	<b>TIC</b>	<b>Retention Time (minutes)</b>	<b>Estimated Concentration</b>	<b>Result Notes</b>
-	Trimethylbenzene isomer	8 10	0 4	
-	Unknown	21 00	0 5	
243-42-5	Benzo(b)naphtho(2,3-d)furan	22 79	0 4	
-	11H-Benzofluorene isomer	23 19	1 8	
-	11H-Benzofluorene isomer	23 30	1 3	
-	Pyrene, methyl isomer	23 36	0 4	
-	Benzo(b)naphthothiophene isomer	24 31	0 6	
-	Benzophenanthrene isomer	24 38	0 4	
-	Unknown	24 72	0 5	
-	Benz(a)anthracene, methyl isomer	25 83	0 4	
-	Benzopyrene isomer	28 25	0 4	
-	Unknown aromatic hydrocarbon	28 88	0 9	
-	Unknown aromatic hydrocarbon	29 26	0 4	
-	Unknown	29 96	0 4	
36728-72-0	28-Nor-17 beta (H)-hopane	30 54	0 5	
57-88-5	Cholesterol	31 07	1 5	
-	Unknown	31 34	0 9	
-	Unknown	33 51	0 5	
-	Unknown	34 12	0 8	
1058-61-3	Stigmast-4-en-3-one	35 15	0 4	

Approved By \_\_\_\_\_

*CC Haines*

TIC052595

05398SVM.AY2 - 6T 9/14/98

Date \_\_\_\_\_

*SEP 14 1998*

*00056*

Page No

*MGT 10/17/98*

## COLUMBIA ANALYTICAL SERVICES, INC.

## Analytical Report

Client: Roy F Weston, Inc  
 Project: Duwamish River/4000-027-001-2019-38  
 Sample Matrix: Sediment

Service Request: K9805398  
 Date Collected: 8/11/98  
 Date Received: 8/12/98

## Base Neutral/Acid Semivolatile Organic Compounds

Sample Name	98334006	Units	mg/Kg (ppm)
Lab Code	K9805398-007	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Bis(2-chloroethyl) Ether	EPA 3550A	8270C	0 04	1	8/17/98	8/28/98	ND	
Phenol	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 04	
2-Chlorophenol	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	ND	
1,3-Dichlorobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	ND	
1,2-Dichlorobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	ND	
1,4-Dichlorobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	ND	
Benzyl Alcohol	EPA 3550A	8270C	0 05	1	8/17/98	8/28/98	ND	
Bis(2-chloroisopropyl) Ether	EPA 3550A	8270C	0 04	1	8/17/98	8/28/98	ND	
2-Methylphenol	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	ND	
Hexachloroethane	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	ND	
N-Nitrosodi-n-propylamine	EPA 3550A	8270C	0 04	1	8/17/98	8/28/98	ND	
3- and 4-Methylphenol Coelution	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	ND	*
Nitrobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	ND	
Isophorone	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	ND	
2-Nitrophenol	EPA 3550A	8270C	0 1	1	8/17/98	8/28/98	ND	
2,4-Dimethylphenol	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	ND	
Bis(2-chlorooxy)methane	EPA 3550A	8270C	0 04	1	8/17/98	8/28/98	ND	
2,4-Dichlorophenol	EPA 3550A	8270C	0 06	1	8/17/98	8/28/98	ND	
Benzoic Acid	EPA 3550A	8270C	0 2	1	8/17/98	8/28/98	ND	
1,2,4-Trichlorobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	ND	
Naphthalene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 02	
4-Chloroaniline	EPA 3550A	8270C	0 06	1	8/17/98	8/28/98	ND	
Hexachlorobutadiene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	ND	
4-Chloro-3-methylphenol	EPA 3550A	8270C	0 04	1	8/17/98	8/28/98	ND	
2-Methylnaphthalene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	ND	
Hexachlorocyclopentadiene	EPA 3550A	8270C	0 1	1	8/17/98	8/28/98	ND	
2,4,6-Trichlorophenol	EPA 3550A	8270C	0 2	1	8/17/98	8/28/98	ND	
2,4,5-Trichlorophenol	EPA 3550A	8270C	0 2	1	8/17/98	8/28/98	ND	
2-Chloronaphthalene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	ND	
2-Nitroaniline	EPA 3550A	8270C	0 1	1	8/17/98	8/28/98	ND	
Acenaphthylene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 03	
Dimethyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 02	
2,6-Dinitrotoluene	EPA 3550A	8270C	0 2	1	8/17/98	8/28/98	ND	
Acenaphthene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 03	
3-Nitroaniline	EPA 3550A	8270C	0 2	1	8/17/98	8/28/98	ND	
2,4-Dinitrophenol	EPA 3550A	8270C	0 2	1	8/17/98	8/28/98	ND	
Dibenzofuran	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 03	
4-Nitrophenol	EPA 3550A	8270C	0 1	1	8/17/98	8/28/98	ND	
2,4-Dinitrotoluene	EPA 3550A	8270C	0 2	1	8/17/98	8/28/98	ND	
Fluorene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 05	
4-Chlorophenyl Phenyl Ether	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	ND	
Diethyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	ND	

\* 3-and 4-Methylphenol coelute, quantitated using 4-Methylphenol

10/11/98

Approved By  
05398SVMAY2 - 7/9/1998

C C Deines

Date

SEP 14 1998

00057  
Page No.

## COLUMBIA ANALYTICAL SERVICES, INC.

## Analytical Report

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9805398  
**Date Collected:** 8/11/98  
**Date Received:** 8/12/98

## Base Neutral/Acid Semivolatile Organic Compounds

<b>Sample Name</b>	98334006	<b>Units</b>	mg/Kg (ppm)
<b>Lab Code</b>	K9805398-007	<b>Basis</b>	Dry
<b>Test Notes</b>			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
4-Nitroaniline	EPA 3550A	8270C	0 1	1	8/17/98	8/28/98	ND	
2-Methyl-4,6-dinitrophenol	EPA 3550A	8270C	0 2	1	8/17/98	8/28/98	ND	
N-Nitrosodiphenylamine	EPA 3550A	8270C	0 04	1	8/17/98	8/28/98	ND	
4-Bromophenyl Phenyl Ether	EPA 3550A	8270C	0 04	1	8/17/98	8/28/98	ND	
Hexachlorobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	ND	
Pentachlorophenol (PCP)	EPA 3550A	8270C	0 1	1	8/17/98	8/31/98	ND	LJ
Phenanthrene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	1 1	
Anthracene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 11	
Di-n-butyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 03	
Fluoranthene	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	2.2	
Pyrene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	1 8	
Butyl Benzyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 06	
3,3'-Dichlorobenzidine	EPA 3550A	8270C	0 2	1	8/17/98	8/28/98	ND	
Benz(a)anthracene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 49	
Chrysene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 91	
Bis(2-ethylhexyl) Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 72	
Di-n-octyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	ND	
Benzo(b)fluoranthene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 77	
Benzo(k)fluoranthene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 61	
Benzo(a)pyrene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 56	
Indeno(1,2,3-cd)pyrene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 41	
Dibenz(a,h)anthracene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 10	
Benzo(g,h,i)perylene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 41	
Carbazole	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 08	

WGT 10/11/98

Approved By

IS2P/0833985VM.AY2 - 79/14/98

Date

SEP 14 1998

00058

Page No

**COLUMBIA ANALYTICAL SERVICES, INC.**

Analytical Report

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9805398  
**Date Collected:** 8/11/98  
**Date Received:** 8/12/98  
**Date Extracted:** 8/17/98  
**Date Analyzed:** 8/28/98

**Tentatively Identified Compounds (TIC)**  
**Base Neutral/Acid Semivolatile Organic Compounds**

**Sample Name** 98334006  
**Lab Code** K9805398-007  
**Test Notes**

**Prep Method** EPA 3550A  
**Analysis Method** 8270C  
**Units** mg/Kg (ppm)  
**Basis** Dry

<b>CAS Number</b>	<b>TIC</b>	<b>Retention Time</b>	<b>Estimated Concentration</b>	<b>Result Notes</b>
		(minutes)		
84-65-1	9,10-Anthracenedione	21 31	0 2	
-	Unknown	21 94	0 2	
-	Unknown	22 53	0 5	
-	Unknown	23 02	0 3	
-	Unknown	23 22	0 3	
-	Benzo(b)naphthothiophene isomer	24 16	0 4	
-	1-Hexacosanal	27 52	0 4	
192-97-2	Benzo(e)pyrene	28 59	0 5	
-	Unknown	29 77	0 4	
-	Hopane isomer	30 32	0 6	
57-88-5	Cholesterol	30 84	0 7	
-	Unknown	31 10	1 0	
-	Unknown	31 25	0 2	
-	Unknown	32 11	0 7	
-	Unknown	33 17	0 4	
-	Unknown	33 26	0 6	
-	Unknown	33 77	1 4	
-	Unknown	34 76	0 3	

Approved By \_\_\_\_\_

*CHHines*

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Date \_\_\_\_\_

*SEP 14 1998*

00059  
 Page No

*MGT 10/17/98*

## COLUMBIA ANALYTICAL SERVICES, INC.

## Analytical Report

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9805398  
**Date Collected:** 8/11/98  
**Date Received:** 8/12/98

## Base Neutral/Acid Semivolatile Organic Compounds

Sample Name	98334007						Units	mg/Kg (ppm)
Lab Code	K9805398-008						Basis	Dry
Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Bis(2-chloroethyl) Ether	EPA 3550A	8270C	0.04	1	8/17/98	8/28/98	ND	
Phenol	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	0.03	
2-Chlorophenol	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
1,3-Dichlorobenzene	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
1,2-Dichlorobenzene	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
1,4-Dichlorobenzene	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
Benzyl Alcohol	EPA 3550A	8270C	0.05	1	8/17/98	8/28/98	ND	
Bis(2-chloroisopropyl) Ether	EPA 3550A	8270C	0.04	1	8/17/98	8/28/98	ND	
2-Methylphenol	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
Hexachloroethane	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
N-Nitrosodi-n-propylamine	EPA 3550A	8270C	0.04	1	8/17/98	8/28/98	ND	
3- and 4-Methylphenol Coelution	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	*
Nitrobenzene	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
Isophorone	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
2-Nitrophenol	EPA 3550A	8270C	0.1	1	8/17/98	8/28/98	ND	
2,4-Dimethylphenol	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
Bis(2-chloroethoxy)methane	EPA 3550A	8270C	0.04	1	8/17/98	8/28/98	ND	
2,4-Dichlorophenol	EPA 3550A	8270C	0.06	1	8/17/98	8/28/98	ND	
Benzoic Acid	EPA 3550A	8270C	0.2	1	8/17/98	8/28/98	ND	
1,2,4-Trichlorobenzene	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
Naphthalene	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	0.02	
4-Chloroaniline	EPA 3550A	8270C	0.06	1	8/17/98	8/28/98	ND	
Hexachlorobutadiene	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
4-Chloro-3-methylphenol	EPA 3550A	8270C	0.04	1	8/17/98	8/28/98	ND	
2-Methylnaphthalene	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
Hexachlorocyclopentadiene	EPA 3550A	8270C	0.1	1	8/17/98	8/28/98	ND	
2,4,6-Trichlorophenol	EPA 3550A	8270C	0.2	1	8/17/98	8/28/98	ND	
2,4,5-Trichlorophenol	EPA 3550A	8270C	0.2	1	8/17/98	8/28/98	ND	
2-Chloronaphthalene	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
2-Nitroaniline	EPA 3550A	8270C	0.1	1	8/17/98	8/28/98	ND	
Acenaphthylene	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
Dimethyl Phthalate	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
2,6-Dinitrotoluene	EPA 3550A	8270C	0.2	1	8/17/98	8/28/98	ND	
Acenaphthene	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	0.03	
3-Nitroaniline	EPA 3550A	8270C	0.2	1	8/17/98	8/28/98	ND	
2,4-Dinitrophenol	EPA 3550A	8270C	0.2	1	8/17/98	8/28/98	ND	
Dibenzofuran	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
4-Nitrophenol	EPA 3550A	8270C	0.1	1	8/17/98	8/28/98	ND	
2,4-Dinitrotoluene	EPA 3550A	8270C	0.2	1	8/17/98	8/28/98	ND	
Fluorene	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	0.04	
4-Chlorophenyl Phenyl Ether	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	
Diethyl Phthalate	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	ND	

\* 3-and 4-Methylphenol coelute, quantitated using 4-Methylphenol

Approved By  
05398SVMAY2 - 8/14/98

C. Deines

Date

SEP 14 1998

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Page No..

MG 14/17/98

## COLUMBIA ANALYTICAL SERVICES, INC.

## Analytical Report

Client: Roy F Weston, Inc  
 Project: Duwamish River/4000-027-001-2019-38  
 Sample Matrix: Sediment

Service Request: K9805398  
 Date Collected: 8/11/98  
 Date Received: 8/12/98

## Base Neutral/Acid Semivolatile Organic Compounds

Sample Name	98334007	Units	mg/Kg (ppm)					
Lab Code	K9805398-008	Basis	Dry					
Test Notes								
Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
4-Nitroaniline	EPA 3550A	8270C	0 1	1	8/17/98	8/28/98	ND	
2-Methyl-4,6-dinitrophenol	EPA 3550A	8270C	0 2	1	8/17/98	8/28/98	ND	
N-Nitrosodiphenylamine	EPA 3550A	8270C	0 04	1	8/17/98	8/28/98	ND	
4-Bromophenyl Phenyl Ether	EPA 3550A	8270C	0 04	1	8/17/98	8/28/98	ND	
Hexachlorobenzene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	ND	
Pentachlorophenol (PCP)	EPA 3550A	8270C	0 1	1	8/17/98	8/31/98	ND	UJ
Phenanthrene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 27	
Anthracene	EPA 3550A	8270C	0.02	1	8/17/98	8/28/98	0 12	
Di-n-butyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	ND	
Fluoranthene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 60	
Pyrene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 78	
Butyl Benzyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 07	
3,3'-Dichlorobenzidine	EPA 3550A	8270C	0 2	1	8/17/98	8/28/98	ND	
Benz(a)anthracene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 39	
Chrysene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 58	
Bis(2-ethylhexyl) Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 48	
Di-n-octyl Phthalate	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	ND	
Benzo(b)fluoranthene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 51	
Benzo(k)fluoranthene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 38	
Benzo(a)pyrene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 42	
Indeno(1,2,3-cd)pyrene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 27	
Dibenz(a,h)anthracene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 06	
Benzo(g,h,i)perylene	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 22	
Carbazole	EPA 3550A	8270C	0 02	1	8/17/98	8/28/98	0 03	

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Approved By \_\_\_\_\_

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C. Haines

Date

SEP 14 1998

00061

Page No

**COLUMBIA ANALYTICAL SERVICES, INC.**

Analytical Report

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9805398  
**Date Collected:** 8/11/98  
**Date Received:** 8/12/98  
**Date Extracted:** 8/17/98  
**Date Analyzed:** 8/28/98

**Tentatively Identified Compounds (TIC)**  
**Base Neutral/Acid Semivolatile Organic Compounds**

Sample Name 98334007  
Lab Code K9805398-008  
Test Notes

Prep Method EPA 3550A  
Analysis Method 8270C  
Units mg/Kg (ppm)  
Basis Dry

CAS Number	TIC	Retention Time (minutes)	Estimated Concentration	Result Notes
-	Unknown	20 86	0 2	
10544-50-0	Sulfur, mol (S8)	21 42	0 2	
-	Unknown	22 09	0 2	
-	Unknown	22 53	1 0	
-	Benzo(b)naphthothiophene isomer	24 16	0 2	
-	Unknown	27 50	0 6	
192-97-2	Benzo(e)pyrene	28 57	0 3	
-	Unknown	29 76	1 0	
-	Unknown	30 30	0 5	
57-88-5	Cholesterol	30 82	0 8	
-	Unknown	31 07	0 7	
-	Unknown	32 09	0 3	
-	Unknown	33 23	0 5	
-	Unknown	33 73	1 0	

Approved By

*CC Deines*

Date

*SEP 14 1998*

00062

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Page No

*MGT 10/17/98*